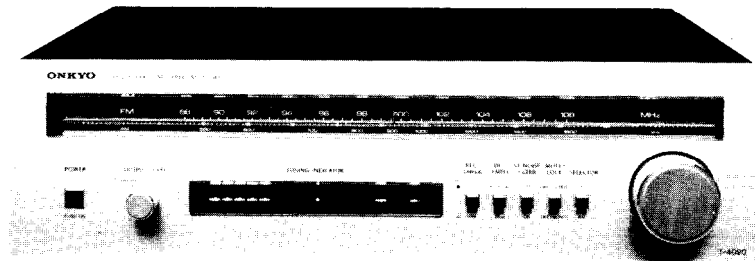


ONKYO® SERVICE MANUAL

QUARTZ LOCKED STEREO TUNER MODEL T-4090



ONKYO®
AUDIO COMPONENTS

SPECIFICATIONS**120V model****FM Section**

Tuning Range: 88 ~ 108 MHz
 Usable Sensitivity: mono: 9.8 dBf, 1.7 μ V
 stereo: 17.2 dBf, 4 μ V

50 dB Quieting
 sensitivity: mono: 14.7 dBf, 3 μ V
 stereo: 36 dBf, 35 μ V

Intermediate Frequency: 10.7 MHz
 Capture Ratio: 1.3 dB
 Image Rejection Ratio: 90 dB
 IF Rejection Ratio: 100 dB
 Spurious Rejection Ratio: 95 dB
 Signal-to-Noise Ratio: mono: 76 dB
 stereo: 68 dB
 Alternate channel att: 70 dB
 AM Suppression Ratio: 55 dB
 Harmonic Distortion: mono: 0.1%
 stereo: 0.25%
 Stereo Separation: 40 dB at 1 kHz
 35 dB at 70 ~ 10,000 Hz
 Subcarrier Suppression: 60 dB
 Muting Level: 17.2 dBf, 4 μ V
 Stereo Threshold: 17.2 dBf, 4 μ V
 Quartz Lock Level: 17.2 dBf, 4 μ V
 Frequency Response: 30 ~ 15,000 Hz + 0.5 - 1.5 dB

AM Section

Tuning Range: 525 ~ 1605 kHz
 Usable Sensitivity: 25 μ V
 Intermediate Frequency: 455 kHz
 Image Rejection Ratio: 50 dB
 IF Rejection Ratio: 40 dB
 Signal-to-Noise Ratio: 45 dB
 Harmonic Distortion: 0.7%

GENERAL

Power Supply Rating: AC 120 volts 60 Hz
 Output Voltage: FM: 0 ~ 1.5 volts
 AM: 0 ~ 0.5 volts
 Outputs: OUTPUT (variable)
 Inputs: FM and AM Antenna
 Antennas: FM: 300 ohms balanced and
 75 ohms unbalanced
 AM: built-in ferrite core
 antenna and external terminal
 Semiconductors: 1 FET, 9 ICs, 28 transistors,
 25 diodes
 Dimensions: 418(W) \times 124 (H) \times 399(D) mm
 16-1/2" \times 4-15/16" \times 15-3/4"
 Weight: 5.9 kg (13 lbs.)

In the interest of further product improvements, specifications are subject to change without notice.

Universal model**FM Section**

Tuning Range: 87.5 ~ 108 MHz
 Usable Sensitivity: mono: 1.3 μ V DIN
 (S/N 26 dB,
 40 kHz devi.)
 1.7 μ V, 9.8 dBf IHF
 stereo: 45 μ V DIN
 (S/N 46 dB,
 40 kHz devi.)
 4 μ V, 17.2 dBf IHF

50 dB Quieting
 sensitivity: mono: 3 μ V, 14.7 dBf
 stereo: 35 μ V, 36 dBf

Intermediate Frequency: 10.7 MHz
 Capture Ratio: 1.3 dB
 Image Rejection Ratio: 90 dB
 IF Rejection Ratio: 100 dB
 Spurious Rejection Ratio: 95 dB
 Signal-to-Noise Ratio: mono: 76 dB
 stereo: 68 dB
 Alternate channel att.: 80 dB (IHF)
 Selectivity: 70 dB (DIN)
 (\pm 300 kHz, 40 kHz devi.)

AM Suppression Ratio: 55 dB
 Harmonic Distortion: mono: 0.1%
 stereo: 0.25%

Stereo Separation: 40 dB at 1 kHz
 35 dB at 70 ~ 10,000 Hz

Subcarrier Suppression: 60 dB
 Muting Level: 4 μ V
 Stereo Threshold: 4 μ V
 Quartz Lock Level: 4 μ V
 Frequency Response: 30 ~ 15,000 Hz + 0.5, -1.5 dB

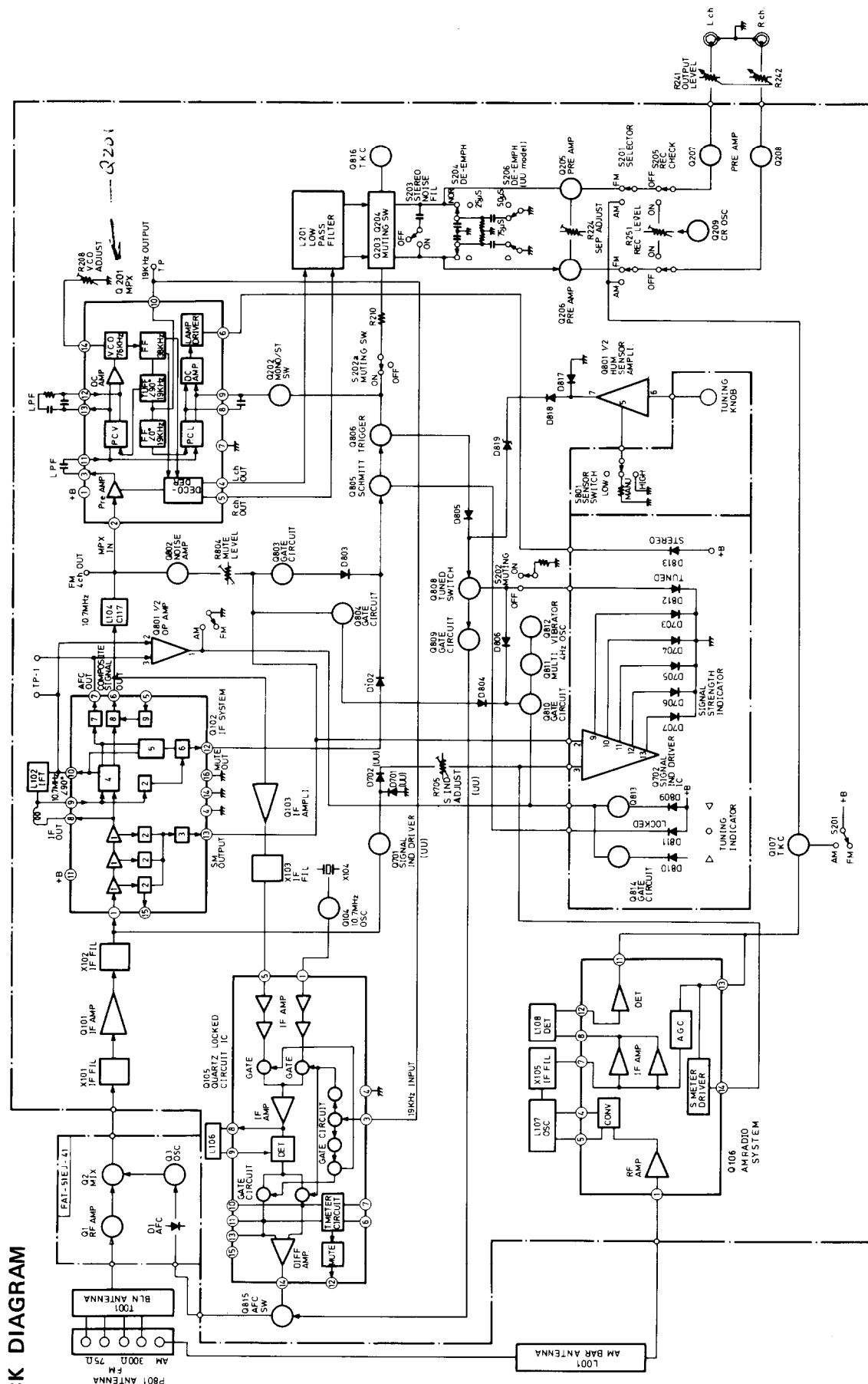
AM Section

Tuning Range: 525 ~ 1605 kHz
 Usable Sensitivity: 25 μ V
 Intermediate Frequency: 455 kHz
 Image Rejection Ratio: 50 dB
 IF Rejection Ratio: 40 dB
 Signal-to-Noise Ratio: 45 dB
 Harmonic Distortion: 0.7%

GENERAL

Power Supply Rating: AC: 110/120/220/240 volts
 50/60 Hz
 Output Voltage: FM: 0 ~ 1.5 volts
 AM: 0 ~ 0.5 volts
 Outputs: OUTPUT (variable)
 Inputs: FM and AM Antenna
 Antennas: FM: 300 ohms balanced and
 75 ohms unbalanced
 AM: built-in ferrite core
 antenna and external terminal
 Semiconductors: 1 FET, 9 IC's, 29 transistors,
 27 diodes
 Dimensions: 418(W) \times 124(H) \times 399(D) mm
 16-1/2" \times 4-15/16" \times 15-3/4"
 Weight: 5.9 kg (13 lbs.)

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MPX DECODER IC

P.C.V: Phase comparator for V.C.O

P.C.L: Phase comparator for lamp

TUFF: Direct coupled type flip-flop

V.C.O: Voltage controlled oscillator

L.P.F: Low pass filter

IF SYSTEM IC

1. IF amplifier

2. Level detector

3. Signal meter circuit

4. Quadrature detector

5. OV switch

6. Muting drive circuit

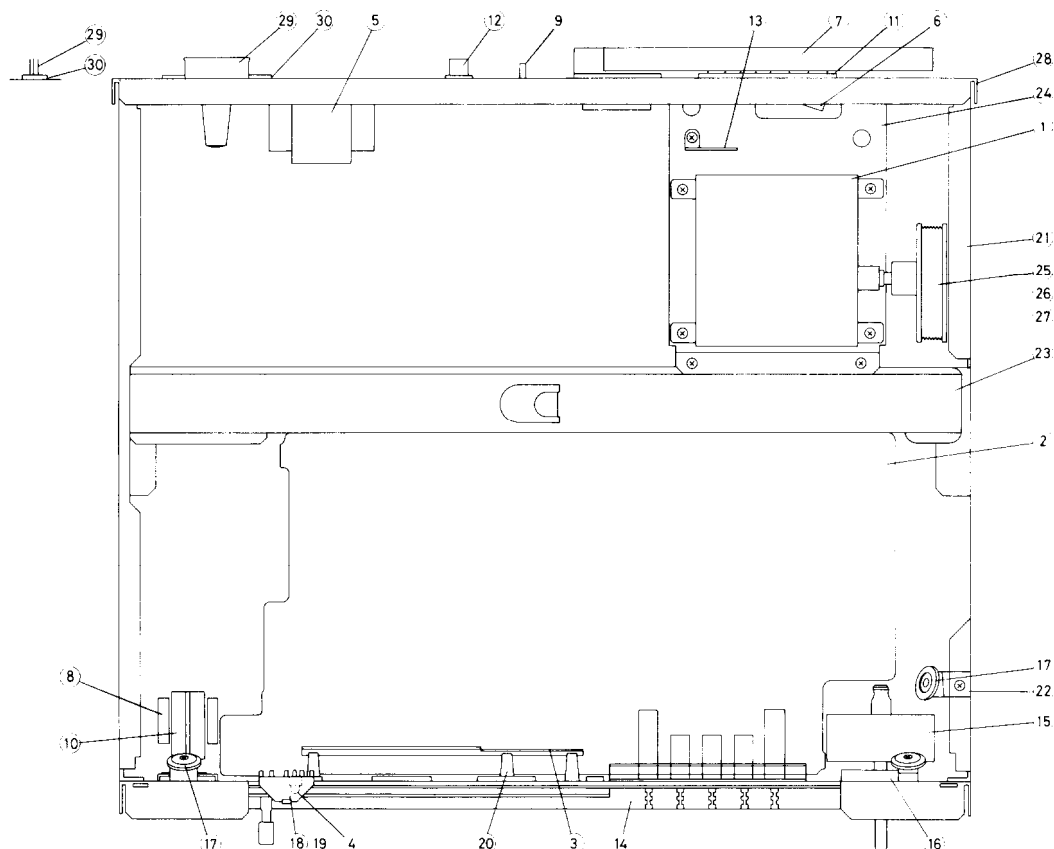
7. AFC amplifier

8. Audio amplifier

9. Audio muting circuit

NOTE: (UU): Only Universal model

COMPONENT LOCATION



PARTS LIST

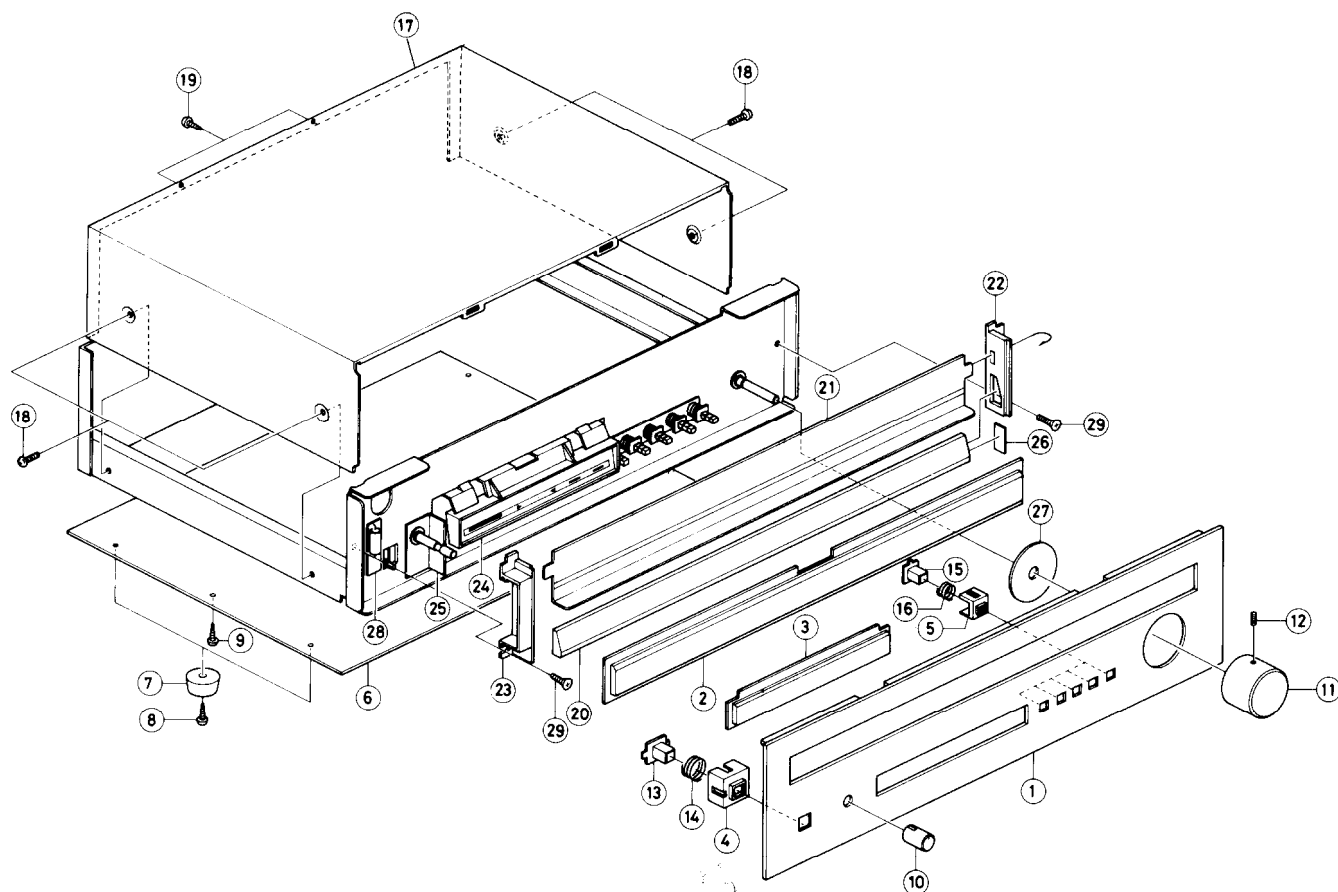
120V model

REF. NO.	CIRCUIT NO.	PARTS NO.	DESCRIPTION
1	U1	240038	FAT-51UJ-41, FM front end
2	U2	13639536	NARF-636, FM/AM tuner p.c.b.
3	U3	13639537	NADIS-637, Indicator p.c.b.
4	PL802, PL803	210057	PL6.3V, 0.15AW 1.5, Indicator light
5	T901	230284A	NPT-669D, Power transformer
6	T001	233026	NBLN-1, Balun transformer
7	L001	232066	NMA-3012, AM bar antenna
8	C901	3504012	UL125V103M, UL capacitor
9	S801	25065016	NSS-2327, Hum sensor selector switch
10	S901	25035135	NPS-111-L100P, Power switch
11	P801	25060021B	NTM-3PUM1, Antenna terminal
12	P802	25045026	NPJ-2PRBL04, Output terminal
13	P803	251070	LG-2L, Terminal
14	A001	27110080	Front bracket
15	A002	27205017	Drive shaft
16	A003	27300071	Bearing
17		27185002A	Dial pulley
18	A005	27220011	Slider, pointer
19	A006	28165047	Pointer
20	A012	27190045	Holder, indicator p.c.b.
21	A030	27115043A	Side bracket
22	A031	27140269	Bracket, pulley
23	A032	27130149A	Bracket, AM/FM tuner p.c.b.
24	A033	27130150	Bracket
25	A034	270760A	250mm, Dial drum
26	A035	273803	SP-14A, Spring, dial drum
27	A036	273903	155cm, Stringing
28	A049	27120159	Back panel
29	W901	253099	AS-UC-3, Power supply cord
30	W901a	270025	3R-3P-4, Strainrelief

Universal model

REF. NO.	CIRCUIT NO.	PARTS NO.	DESCRIPTION
1	U1	240038	FAT-51UJ-41, FM front end
2	U2	13640536A	NARF-636a, FM/AM tuner p.c.b.
3	U3	13639537	NADIS-637, Indicator p.c.b.
4	PL802, PL803	210057	PL6.3V, 0.15AW 1.5, Indicator light
5	T901	230285	NPT-669ADGQ, Power transformer
6	T001	233036	NBLN-1, Balun transformer
7	L001	232066	NMA-3012, AM bar antenna
8	C901, C902	3500052	PME271Y510CEE, IS capacitor
9	S801	25065016	NSS-2327, Hum sensor selector switch
10	S901	25035136	NPS-121-101P, Power switch
11	P801	25060021B	NTM-3PUM1, Antenna terminal
12	P802	25045026	NPJ-2PRBL04, Output terminal
13	P803	251070	LG-2L, Terminal
14	A001	27110080	Front bracket
15	A002	27205017	Drive shaft
16	A003	27300071	Bearing
17		27185002A	Dial pulley
18	A005	27220011	Slider, point
19	A006	28165047	Pointer
20	A012	27190045	Holder, indicator p.c.b.
21	A030	27115043A	Side bracket
22	A031	27140269	Bracket, pulley
23	A032	27130149A	Bracket, AM/FM tuner p.c.b.
24	A033	27130150	Bracket
25	A034	270760A	250mm, Dial drum
26	A035	273803	SP-14A, Spring, dial drum
27	A036	273903	155cm, Stringing
28	A049	27120160	Back panel
29	F901	252023	0.5A-T, Fuse
30	F901a	25050021	X-17240, Voltage selector
	P901	25050018	PA-125, 3P inlet

EXPLODED VIEW



EXPLODED VIEW – PARTS LIST

REF. NO.	PARTS NO.	DESCRIPTION	REF. NO.	PARTS NO.	DESCRIPTION
	13639121-1	Front panel ass'y (1, 2, 3)	15	28320318	Push switch knob
1	27210123	Front panel	16	27180037	Spring
2	28191038	Dial glass	17	28184052	Top cover
3	28191037	Indicator glass		28140020	4t x 10 x 40, Cushion
4	27267048	Guide, power switch	18	838440109	4TTB+10C(BC), screw
5	27267049	Guide, push switch	19	834430062	3STS+6BQ(BC), screw
6	27170055	Bottom board	20	28130076A	Dial plate
7	27175009	Leg	21	28133014	Back plate
8	831130162	3STW+16BQ, Tapping screw	22	27250026	Lamp case (R)
9	831130082	3STW+8BQ, Tapping screw	23	27250027	Lamp case (L)
10	28320316	Output level control knob	24	27190045	Holder
11	28320309	Tuning knob	25	27240019	Illumination bracket
12	801146	4 x 6, Screw	26	262003	Tape
13	13639125	Power switch knob ass'y (4, 13, 14)	27	28140126	Cushion
13	28320319	Power switch knob	28	13639539	Dial illumination lamp p.c.b.
14	27180038	Spring		210064	250mA, 6.3V, Dial illumination lamp
15	13639126	Push switch knob ass'y (5, 15, 16)	29	831130082	3STW+8BQ, Tapping screw

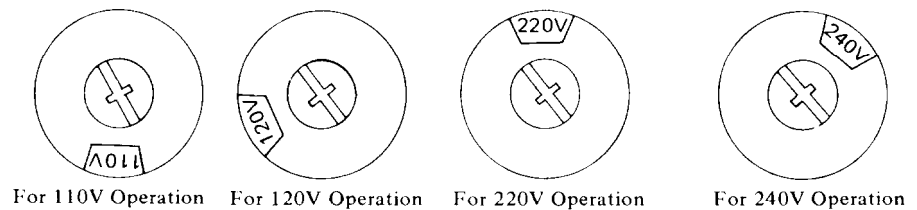
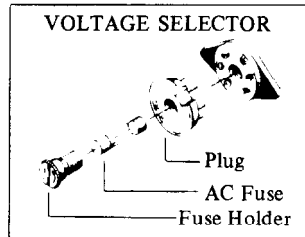
SERVICE PROCEDURES

1. REPLACING THE AC FUSE

Universal Model

This model is equipped with a universal power transformer to permit operation at either power source of 110, 120, 220 or 240V AC 50/60Hz.

To convert the unit to a different power source voltage, change the plug as illustrated in the drawing below.



CAUTIONS: 1. For continued protection against fire hazard, replace only with same type and same rating fuse.

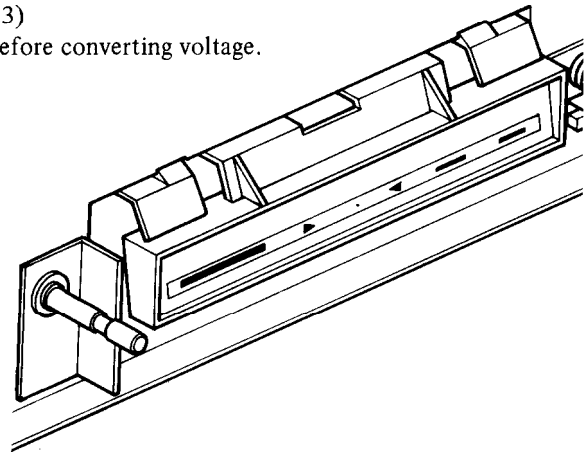
110/120V model 1A-T (Parts No. 252001)

220/240V model 0.5A-T (Parts No. 252023)

2. Disconnect power supply cord from AC outlet before converting voltage.

2. REPLACING THE HOLDER OF INDICATOR

1. Remove the two screws holding the top cover and back panel.
2. Remove the four screws holding the top cover and side brackets.
3. Pull out the output level knob.
4. Remove the five screws holding the front panel and front bracket.
5. Disconnect the holder of indicator by pressing against the nails of holder from front side.



3. DE-EMPHASIS SWITCH

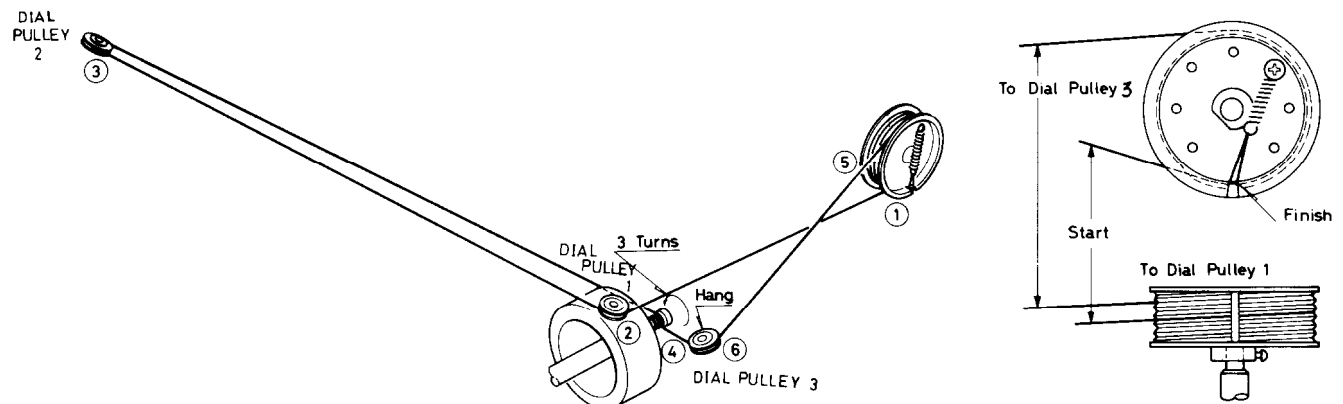
The 25 μ sec/Normal selector switch for Dolby FM broadcasts is located on the front panel. The 50 μ sec/75 μ sec selector switch employed in the Universal Type is located on the bottom board. When shipped from the factory, this bottom board switch is set to the 50 μ sec position. For use in 75 μ sec regions, switch over to the 75 μ sec position.



4. SENSOR SWITCH

For matching the automatic FM tuning servo locked system to the various operating conditions. Set to LOW initially and switch to NORMAL or HIGH if the TUNED lamp does not turn off as soon as the tuning knob is touched.

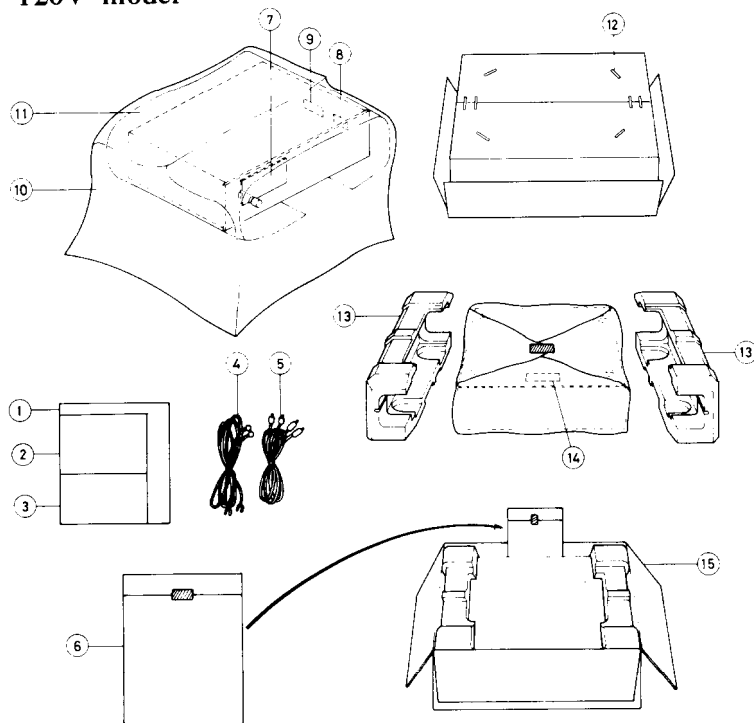
STRINGING DIAGRAM



1. Close the variable capacitor complete and tie the dial cord to the spring of the drum.
2. Thread the dial cord in the direction of arrow from (1) to (3) and wind the dial cord three turns around the tuning shaft clockwise.
3. Wind the dial cord 1½ turns around the dial drum.
4. Thread the dial cord to the dial pulley 3.

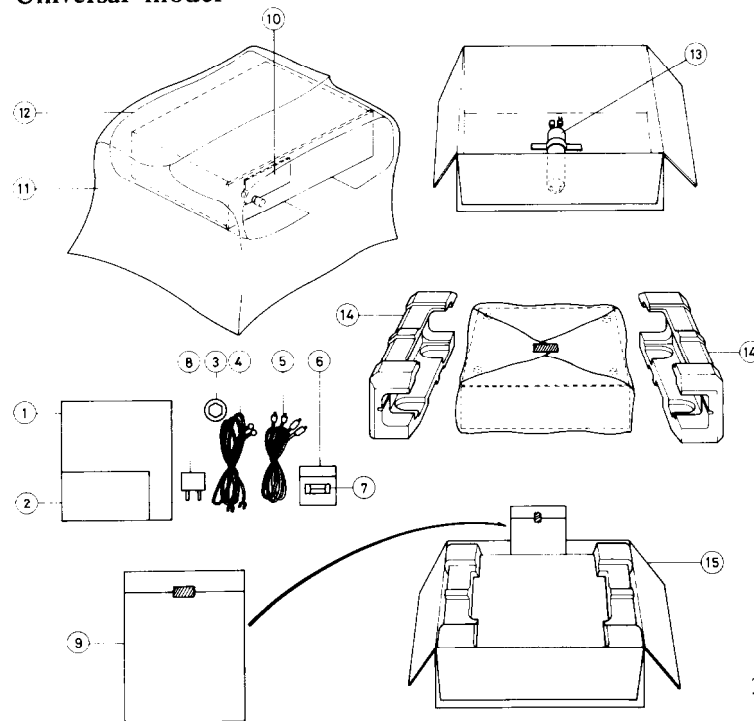
PACKING PROCEDURES

120V model



1. All printed material and accessory items are placed in the poly bag.
2. The sensor tag is attached to the output level volume shaft.

Universal model



PARTS LIST

120V model

REF. NO.	PARTS NO.	DESCRIPTION
1	29340321	Instruction manual
2	29358002	Service station list
3	29365006	Warranty card
4	292064	5059-01, FM antenna
5	253074	Connection cord
6	29100006	250 × 350mm, Poly bag
7	29355045	Sensor tag
8	29380040	Cabinet composite label
9	282969	Caution label A
10	29095012	500 × 800mm, Protection sheet
11	29100036	850 × 550mm, Poly bag
12	282301	Sealing hook
13	29090398	Pad
14	293041	Caution label
15	29050266	Carton box

Universal model

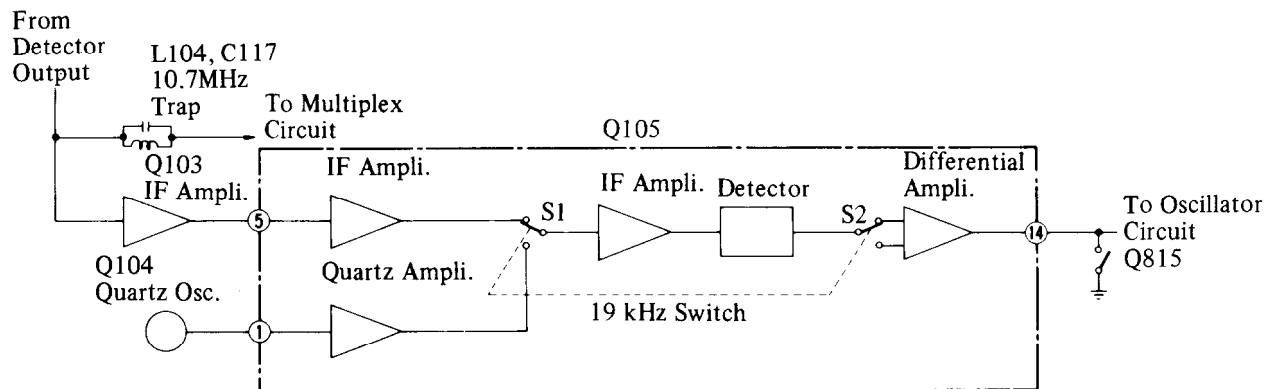
REF. NO.	PARTS NO.	DESCRIPTION
1	29340320	Instruction manual
2	29365005-1	Warranty card (G)
3	292075	Metal, "LOCKED"
4	292064	5059-01, FM antenna
5	253074	Connection cord
6		
7	252001	1A-T, AC fuse (U)
8	25055018	CV-K-1, Conversion plug (U)
9	29100006	250 × 350mm, Poly bag
10	29355045	Sensor tag
11	29100036	850 × 550mm, Poly bag
12	29095012	500 × 800mm, Protection sheet
13	253089	Power supply cord (G)
	13876801	Power supply cord (U)
	29380038	Voltage tag
14	29090398	Pad
15	29050266	Carton box

NOTE: (U): Universal model
(G): only Germany model

1. All printed material and accessory items are placed in the poly bag.
2. The sensor tag is attached to the output level volume shaft.

CIRCUIT DESCRIPTION

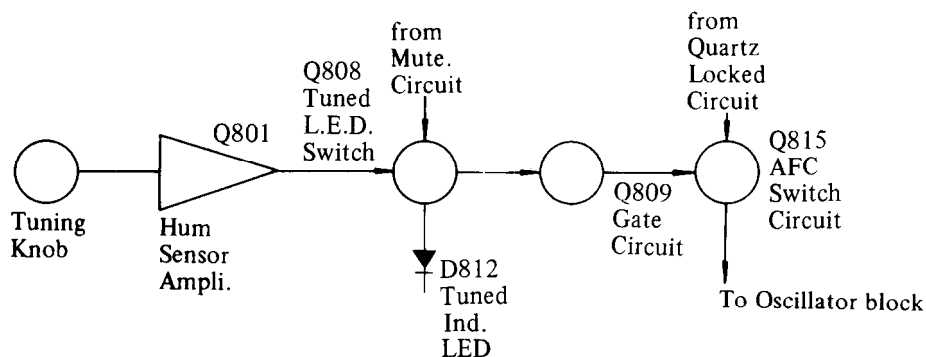
1. QUARTZ LOCKED CIRCUIT



The quartz locked circuit compares the frequency difference between the 10.7MHz reference signal and the IF signal, the difference being used to subsequently drive the AFC circuit.

A 10.7MHz component is extracted from the quadrature detector output by the L104 and C117 trap, amplified by the Q103 IC, and applied to pin no. 5 of the Q105 IC. An accurate 10.7MHz reference signal is generated by the quartz oscillator, and applied to pin no. 1 of the same IC. A 19kHz square wave is obtained from pin no. 10 of the PLL IC, and applied to pin no. 3 of Q105. The IF signal and the quartz oscillator reference signal are switched back and forth in a 19kHz cycle, and passed on to the detector and amplification stages. When S1 and S2 are both connected to the IF signal line, the IF frequency is detected, resulting in the generation of a voltage whose level corresponds to the IF frequency. This voltage is then applied to one of the differential amplifier inputs. When S1 and S2 are then both switched across to the quartz oscillator signal line, the quartz oscillator reference signal is detected, converted into the corresponding voltage, and applied to the other input of the differential amplifier. The difference between the IF detector DC component and quartz oscillator detector component is then amplified, appearing at pin no. 14 of the IC. This voltage serves as the AFC circuit control voltage. Any slight drift or deviation in the detector transformer will therefore result in the same amount of drift in both lines, thereby maintaining a constant difference. Precise local oscillator frequency will thus be kept at all times.

2. AFC SWITCHING CIRCUIT



In order to ensure accurate tuning, the AFC circuit is turned off automatically once the tuning knob is touched, and also when the muting circuit is switched off.

When a station is tuned, Q808 will turn off and Q809 turn on (since Q805 will already be off and Q806 on), resulting in the LOCKED lamp turning on. And since Q815 will turn off when Q809 turns on, the AFC circuit will also begin to operate.

When the tuning knob is touched, a certain amount of hum is induced. This hum is amplified by Q801, rectified (full-wave) by D817 and D818 into a DC signal, and applied to Q808 is consequently turned on, resulting in the AFC circuit being switched off. If, however, the hum level is rather low, the LOCKED lamp might not turn on even when the tuning knob is touched. If this happens, reset the rear panel sensor switch to either the Normal or High positions.

3. SIGNAL INDICATOR DRIVER CIRCUIT

The signal indicator driver circuit is activated by the detector of three or two point. Three point detector is used the Universal model and two point detector is used the 120V model. Q702 is the signal strength indicator driver IC. The IF signal is rectified by the IF level detector circuits and changed the DC component. The DC component applied to pin no. 2 and no. 3 of Q702 is amplified. The signal strength indicator LEDs connected to the IC output terminals pin nos. 9–13 are lit up in succession depending on the input level.

ALIGNMENT PROCEDURES

INSTRUMENTS REQUIRED

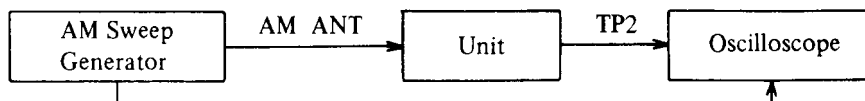
1. DC Voltmeter
2. AM Sweep Generator
3. AM/FM Signal Generator
4. AC VTVM
5. Oscilloscope
6. Monitor scope
7. Distortion Analyzer
8. Stereo Modulator
9. Frequency Counter

GENERAL ALIGNMENT CONDITIONS

1. Signal input should be kept as low as possible.
 2. Standard modulation is 400Hz 30% (AM), 1kHz 100% (FM MONO), pilot 9% sub and main 91% (FM STEREO).
 3. Standard knob position
- De-emphasis Normal
Muting/Lock Off
Mode Stereo
Rec. check Off

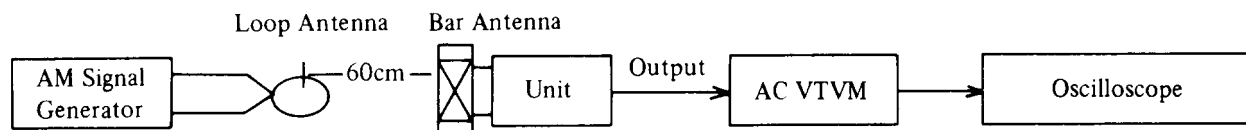
(1) AM IF ALIGNMENT

1. Set SELECTOR switch to AM.
2. Set radio dial to quiet point.

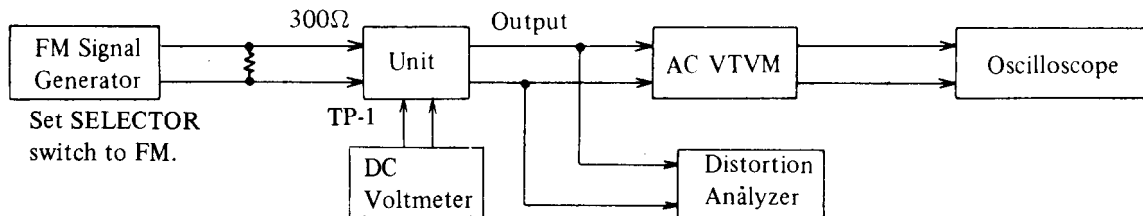


Set signal	Adjust	Oscilloscope	Remarks
455kHz	X105	Maximum Symmetrical Response	Usually not necessary to adjust

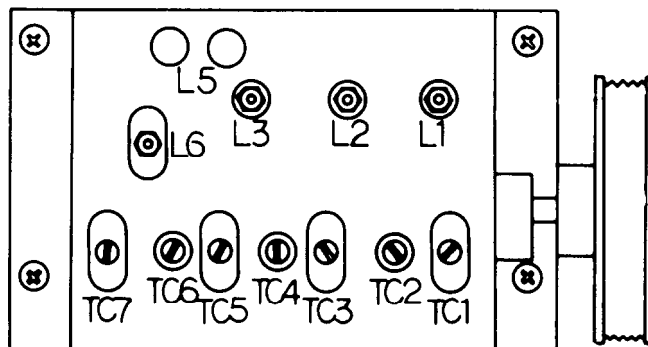
(2) AM RF ALIGNMENT



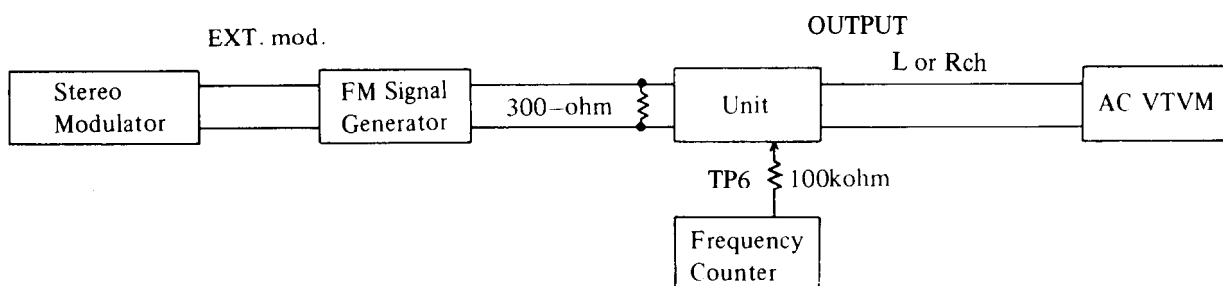
Step	Set Signal	Set Radio Dial	Adjust	VTVM reading	Remarks
1	515kHz 400Hz 30%	Lower end (515kHz)	L107	Maximum	Repeat steps 1 and 2 as necessary
2	1680kHz 400Hz 30%	Upper end (1680kHz)	TC5	Maximum	
3	600kHz 400Hz 30%	600kHz	L001	Maximum	Repeat steps 3 and 4 as necessary
4	1400kHz 400Hz 30%	1400kHz	TC2	Maximum	

(3). FM FRONT END ALIGNMENT

Step	FM Signal Generator	Dial to set	Adjust	Output Indicator	Adjust for	Remarks
1	No signal	Quiet Point	T101 Bottom	DC Voltmeter	OV	Repeat Steps 1 and 2 as necessary
2	98MHz 65dBf(60dB) 1kHz 75kHz devi.	98MHz	T101 Top	Distortion Analyzer	Minimum	
3	90MHz 65dBf(60dB) 1kHz 75kHz devi.	90MHz	L6	DC Voltmeter	OV	Repeat Steps 3 and 4 as necessary
4	106MHz 65dBf(60dB) 1kHz 75kHz devi.	106MHz	TC7		OV	
5	90MHz 20dBf(15dB) 1kHz 75kHz devi.	90MHz	L1 L2 L3	AC VTVM or Oscilloscope	Maximum	Repeat Steps 5 and 6 as necessary
6	106MHz 20dBf(15dB) 1kHz 75kHz devi.	106MHz	TC1 TC3 TC5		Maximum	
7	98MHz 65dBf(60dB) 1kHz 75kHz devi.	98MHz	L5	Distortion Analyzer	Minimum	



Front End Top View

(4). MULTIPLEX ALIGNMENT

Step	FM Signal Generator	Stereo Modulator	Dial to set	Adjust	Output Indicator	Adjust for	Remarks
1	98MHz no mod. 65dBf (60dB)	—————	98MHz	R208	Frequency Counter	19,000±19Hz	
2	STEREO INDICATOR should light up when stereo program is being received.						
3	98MHz EXT. Mod. 65dBf (60dB)	Pilot Sig. 9% Main & Sub Sig. 1KHz Lch	98MHz	R224	AC VTVM Right ch.	Minimum	Repeat Steps 3 & 4 as necessary Same separation
4	Same as above	Pilot Sig. 9% Main & Sub Sig. 1KHz Rch	98MHz	R224	AC VTVM Left ch.	Minimum	

(5). QUARTZ LOCKED CIRCUIT ADJUSTMENT

1. Connect the signal generator to the 300ohm antenna terminals and the DC voltmeter to the detector output (pin nos. 10)
2. Set the SG output to 98MHz, 1kHz 75kHz devi., 65dBf (60dB).
3. Turn the tuner to 98MHz.
4. Adjust the voltage to 3.5V with a detector coil of L106.
5. Then connect the DC voltmeter to the AFC output terminal of TP-5.
6. Place the short circuit across TP-4 (pin nos. 10 and 11).
7. Adjust the semi-fixed resistor of R137 to bring the AFC output voltage to zero.
8. Remove the short circuit across TP-4.
9. Adjust the semi-fixed resistor of R130 to bring the AFC output voltage to zero.

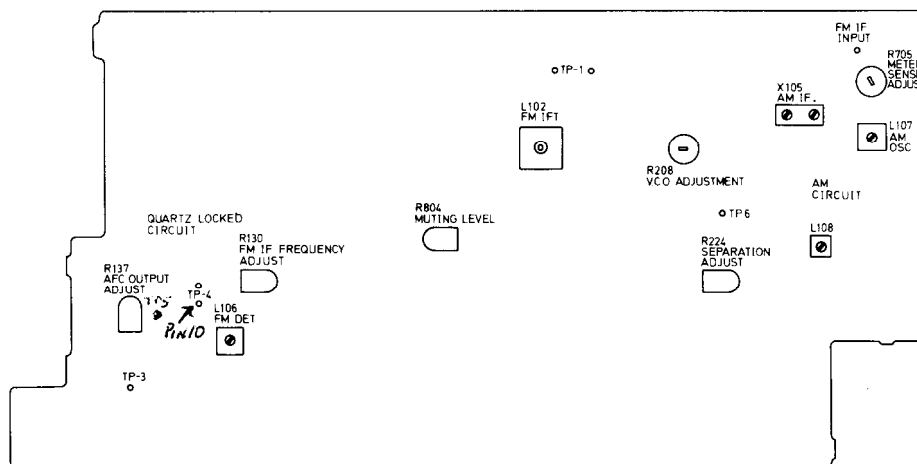
(6). RECORDING CHECK LEVEL ADJUSTMENT

1. Connect the signal generator to the 300 ohm antenna terminals and the AC voltmeter to the output terminals.
2. Set the SG output to 98MHz, 400 Hz 75kHz devi., 65dBf (60dB).
3. Turn the tuner to 98MHz.
4. Adjust the output level control to bring the output level to 300mV.
5. Push the RECORDING CHECK switch to ON.
6. Adjust the semi-fixed resistor of R251 to bring the output voltage to 150mV.

(7). SIGNAL STRENGTH INDICATOR ADJUSTMENT

1. Connect the signal generator to the 300ohm antenna terminals.
2. Set the SG output to 98MHz, 1kHz 75kHz devi. 65dBf (60 dB).
3. Turn the tuner to 98MHz.
4. Adjust the semi-fixed resistor of R705 to light up the 5th L. E.D.

NOTE: Only Universal model.



Adjustment Point

AM/FM TUNER PC BOARD (NARF-636) – PARTS LIST (120V model)

CIRCUIT NO. PARTS NO. DESCRIPTION

ICs
 Q101 222452 TA-7302P
 Q102 222540 HA-11225
 Q103 222468 BA-402
 Q105 222469 BA-661
 Q106 222418 HA-1151
 Q201 222419 HA-1156W
 Q801 222465 NJM-4558D
 Q901 222542 FS-7812M

Transistors
 Q104 2210123 2SC380(0)
 Q107, Q202 2210746 or 2SC945(A)P or
 2211255 2SC1815(GR)
 Q203, Q204 2210746 2SC945(A)P
 Q205-Q208 2211733 2SC1845(E)
 Q209, Q815 2210746 2SC945(A)P
 Q802-Q812
 Q816 2210746 or 2SC945(A)P or
 2211255 2SC1815(GR)
 Q902 2211454 2SA1015(Y)

Diodes
 D101, D102 223105 1S1555
 D103 4000022 VD-1212
 D104, D106 223105 1S1555
 D201, D202
 D801, D802 223103 1N60
 D803-D807 223105 1S1555
 D814-D816
 D817, D818 223103 1N60
 D819 223943 or RD-4.7EB or
 224011 YZ-047
 D901 223862 WL-01
 D902 223924 WZ-130
 D903 223858 or GP-08D or
 223802 1S1885

Coils
 L101 233144 NCH-1020
 L103, L105 233105 or NCH-1005 or
 233024 NCH-1501
 L104 233121 NCH-3012
 L107 232065 NMO-2002
 L201 233032A NMC-8-7
 L801 233122 NCH-3013
 L802 233031 NMC-9-1

Transformers
 L102 233143 NFIF-6008
 L106 233120 NFIF-6006
 L108 232041 NIT-0509

Ceramic filters
 X101 3010018 SFI-10.7MA
 X102 3010024 SFE-10.7ML-A
 X103 3010006 SFE10.7MA(RED)
 X105 3010012 CFT-455B

X'tal
 X104 3010015 XTL-10.7M

Capacitors
 C107 352750471 4.7 μ F, 25V, Elect.
 C108, C239 352784791 0.47 μ F, 50V, Elect.
 C110 352721011 100 μ F, 6.3V, Elect.
 C114, C147 352780101 1 μ F, 50V, Elect.
 C116, C119 352741001 10 μ F, 16V, Elect.
 C129 352744701 47 μ F, 16V, Elect.
 C133, C146 352741001 10 μ F, 16V, Elect.
 C142 352742201 22 μ F, 16V, Elect.
 C150 352741011 100 μ F, 16V, Elect.
 C151 352741021 1,000 μ F, 16V, Elect.
 C173 372323614 360pF \pm 5%, 50V, ST
 C178, C240 352741001 10 μ F, 16V, Elect.
 C179 352741011 100 μ F, 16V, Elect.
 C182 352780101 1 μ F, 50V, Elect.
 C183 352780331 3.3 μ F, 50V, Elect.
 C185 374124737 0.047 μ F \pm 20%, 50V, DE
 C187 352741001 10 μ F, 16V, Elect.
 C201 352741001 10 μ F, 16V, Elect.
 C202 352741021 1,000 μ F, 16V, Elect.
 C203 374124737 0.047 μ F \pm 20%, 50V, DE
 C204, C205 392884797 0.47 μ F, 50V, LL
 C206 392880107 1 μ F, 50V, LL
 C207 372325114 510pF \pm 5%, 50V, ST
 C209 352742211 220 μ F, 16V, Elect.

CIRCUIT NO. PARTS NO. DESCRIPTION

C211, C212 352780221 2.2 μ F, 50V, Elect.
 C219, C220 352780101 1 μ F, 50V, Elect.
 C223, C224 392880107 1 μ F, 50V, LL
 C226 352743311 330 μ F, 16V, Elect.
 C227, C228 352784791 0.47 μ F, 50V, Elect.
 C231, C232 352780101 1 μ F, 50V, Elect.
 C234 352743311 330 μ F, 16V, Elect.
 C705 352741001 10 μ F, 16V, Elect.
 C803 392883397 0.33 μ F, 50V, LL
 C805 352780221 2.2 μ F, 50V, Elect.
 C807 352780101 1 μ F, 50V, Elect.
 C808 352721011 100 μ F, 6.3V, Elect.
 C811 352780101 1 μ F, 50V, Elect.
 C812, C813 352743311 330 μ F, 16V, Elect.
 C815 352742201 22 μ F, 16V, Elect.
 C816 352784791 0.47 μ F, 50V, Elect.
 C817, C823 352741001 10 μ F, 16V, Elect.
 C818 352722211 220 μ F, 6.3V, Elect.
 C819, C820 392880227 2.2 μ F, 50V, LL
 C821 352721011 100 μ F, 6.3V, Elect.
 C905 352764711 470 μ F, 35V, Elect.
 C906 352754711 470 μ F, 25V, Elect.
 C907, C822 352742211 220 μ F, 16V, Elect.
 C909 352764711 470 μ F, 35V, Elect.
 C910 352762211 220 μ F, 35V, Elect.
 C911, C912 352742211 220 μ F, 16V, Elect.
 C914 352734711 470 μ F, 10V, Elect.

Resistors
 R130 5225089 N10HR30KBC, Simi-fixed
 R137 5225056 N10HR5KBC, Semi-fixed
 R208 5225019 N10HR4.7KBD, Semi-fixed
 R224 5225055 N10HR2KBC, Semi-fixed
 R241, R242 5148012 N16RG10KB35, Output level control
 R251 5225017 N10HR10KBC, Semi-fixed
 R804 5225058 N10HR50KBC, Semi-fixed
 R902 441724304 43 Ω , 2W, Metal oxide film

Switch
 S201-S205 25035112 NPS-322-242-L77, Selector/
 Muting/Noise filter/De-empha.
 Rec. check

Shielded plate
 27150103

Radiator
 27160029 RAD-07

LAMP PC BOARD (NAPL-639) – PARTS LIST

CIRCUIT NO. PARTS NO. DESCRIPTION
 PL801 211054 250mA, 6.3V, Pilot lamp

INDICATOR PC BOARD (NADIS-637) – PARTS LIST

CIRCUIT NO. PARTS NO. DESCRIPTION

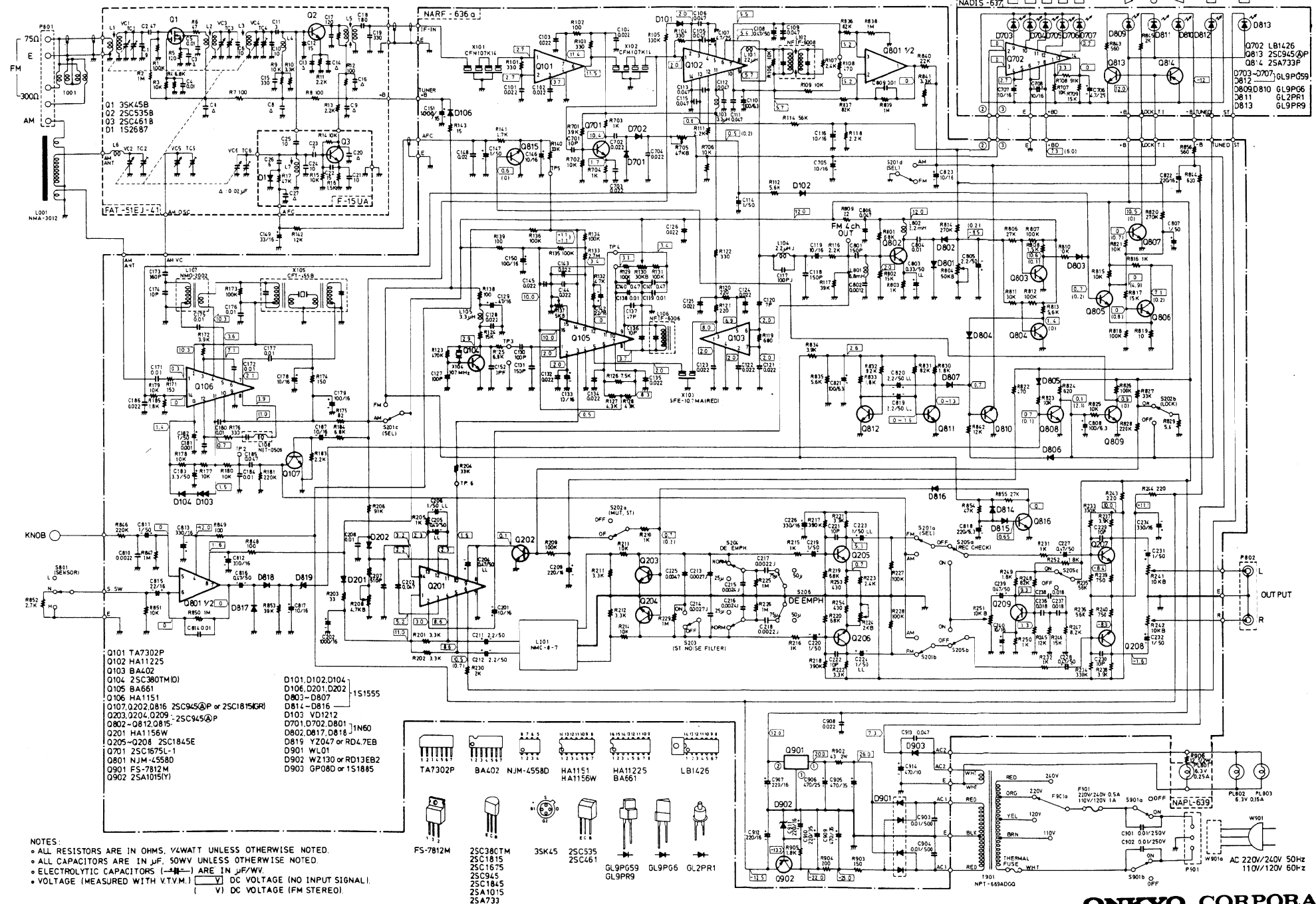
IC
 Q702 222541 LB-1426
Transistors
 Q813 2210746 2SC945A(P)
 Q814 2210803 2SA733(P)
L.E.D.
 D703-D707 225028 GL-9PG59, Green
 D812
 D809, D810 225031 GL-9PG-6, Triangle
 D811 225018 GL-2PR1, Red
 D813 225029 GL-9PR9, Red
Capacitors
 C706 352750471 4.7 μ F, 25V, Elect.
 C707, C708 352741001 10 μ F, 16V, Elect.

NOTE: Capacitor: ST: Polystyren film capacitor
 DE: Non-inductive polyester film capacitor
 LL: Low leakage current type electrolytic capacitor

SCHEMATIC DIAGRAM

Model T-4090

Universal model

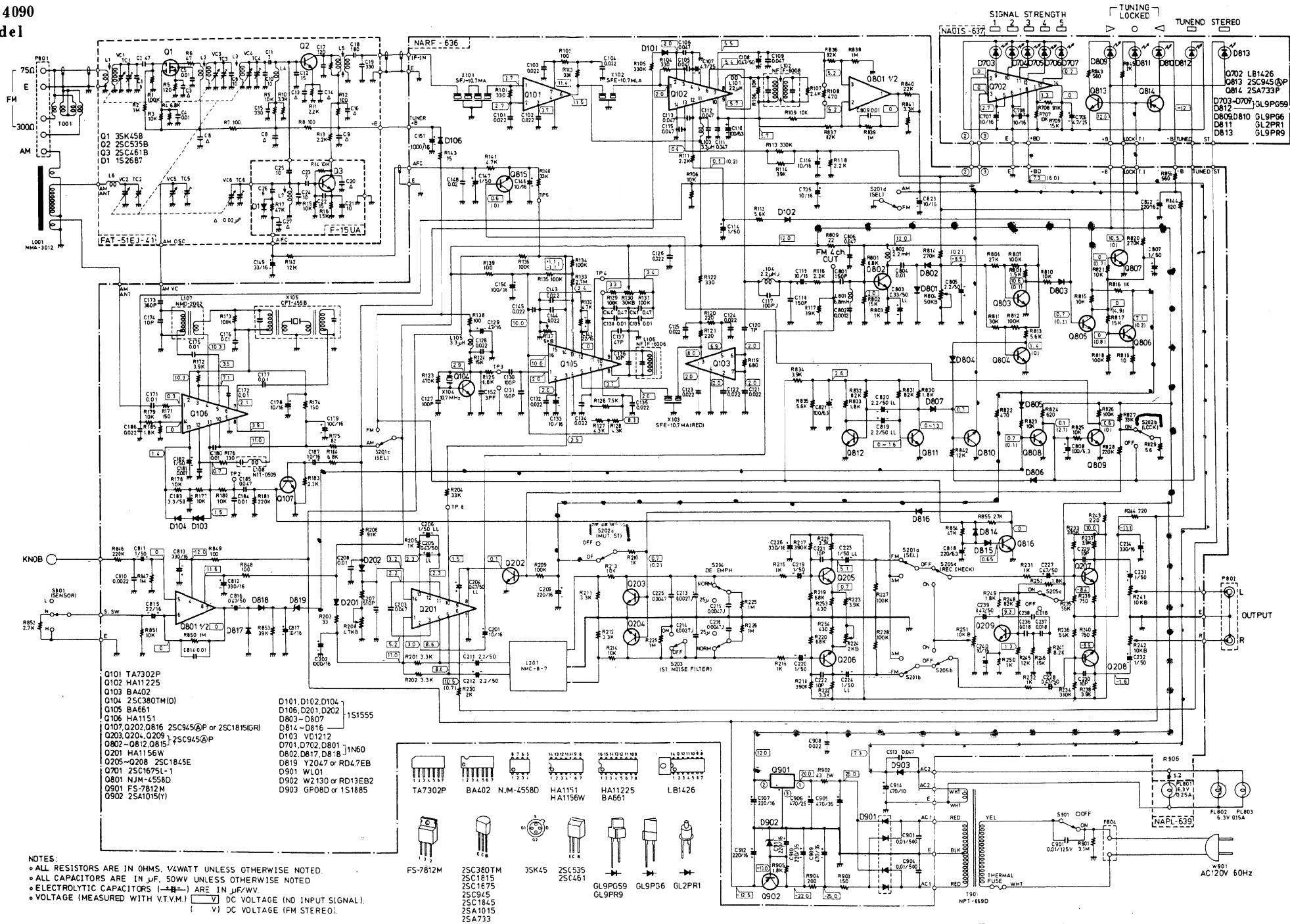


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SCHEMATIC DIAGRAM

Model T-4090

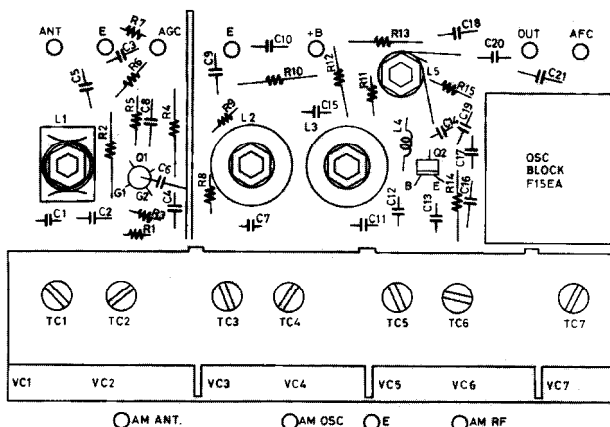
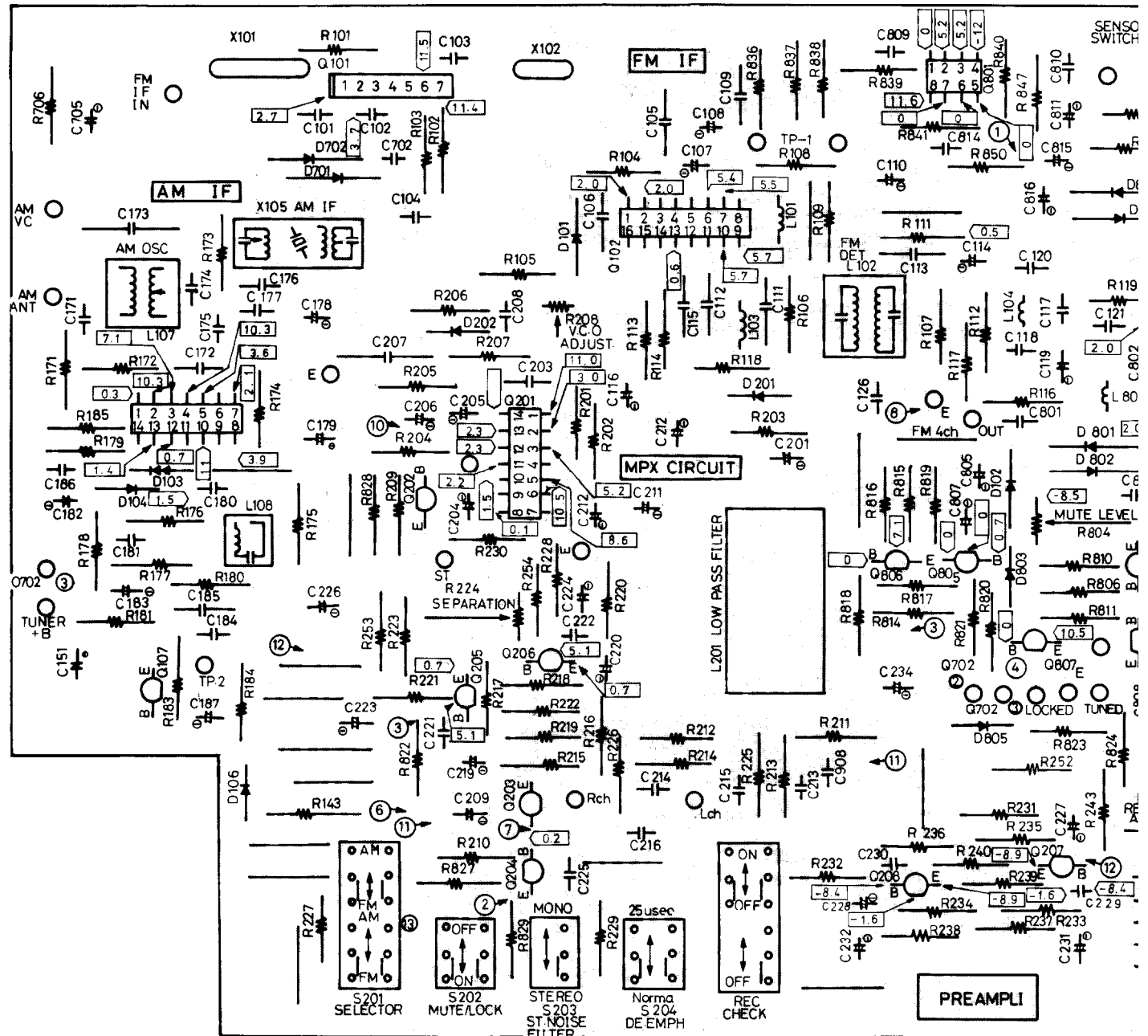
120V model



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PRINTED CIRCUIT BOARD VIEW FROM BOTTOM SIDE

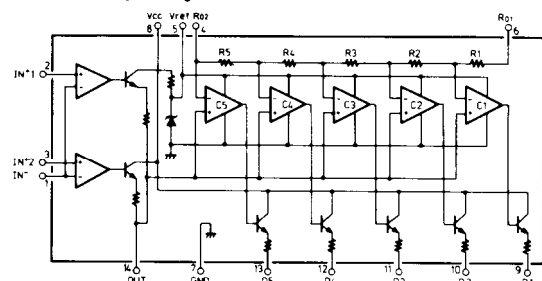
120V model

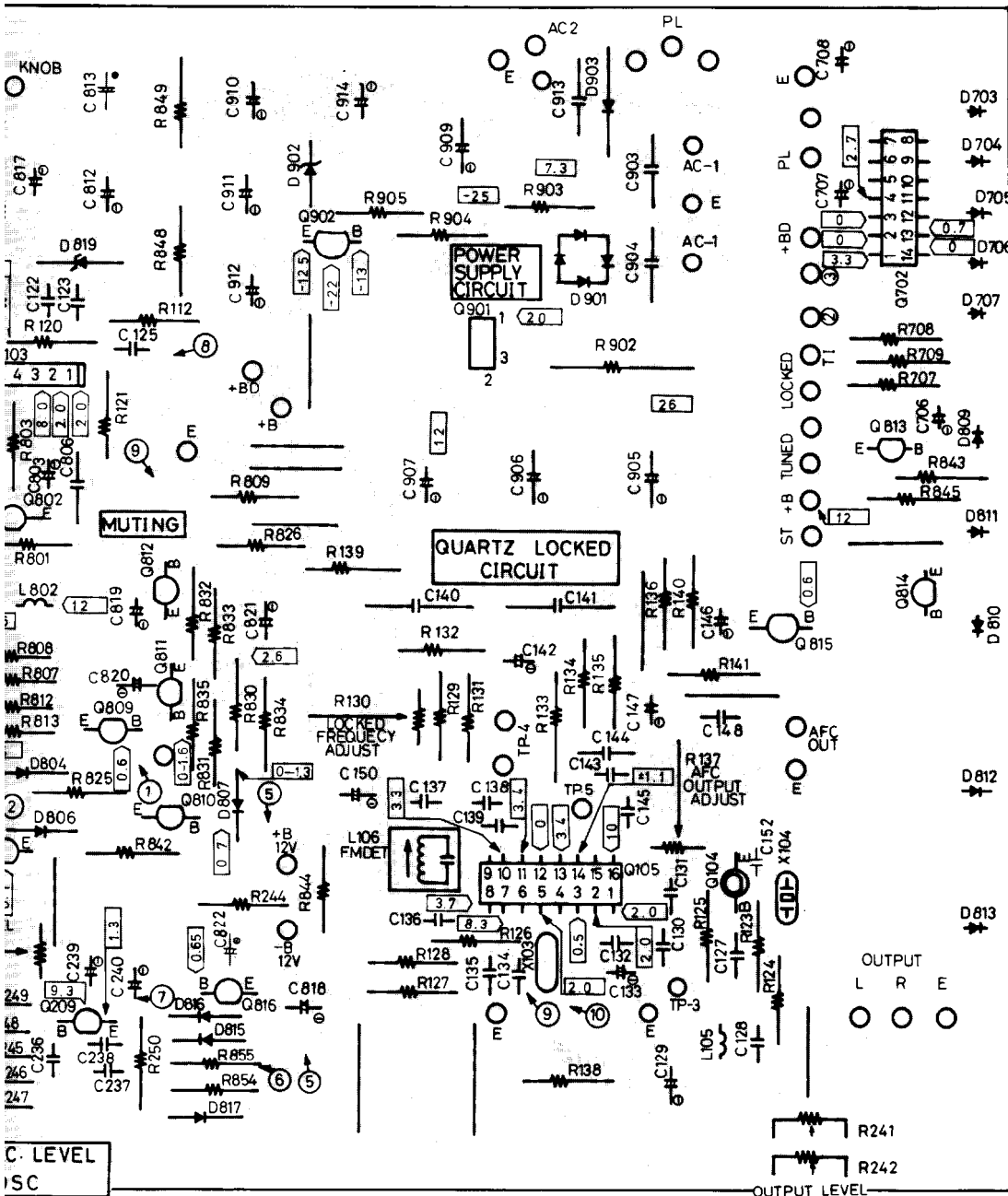


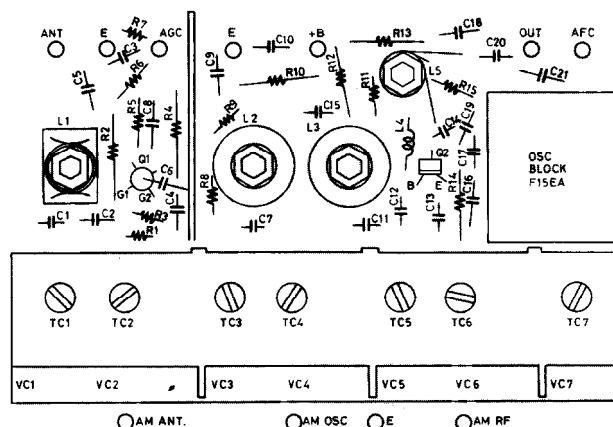
FAT-52-EJ-41 Bottom View

CIRCUIT NO.	PARTS NO.	DESCRIPTION
Q1	Transistors	3SK45 (B)
Q2		2SC535 (B)
	OSC Block	F-15EA
	222013	

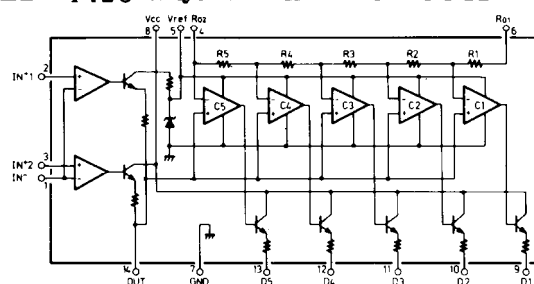
LB-1426 EQUIVALENT CIRCUIT

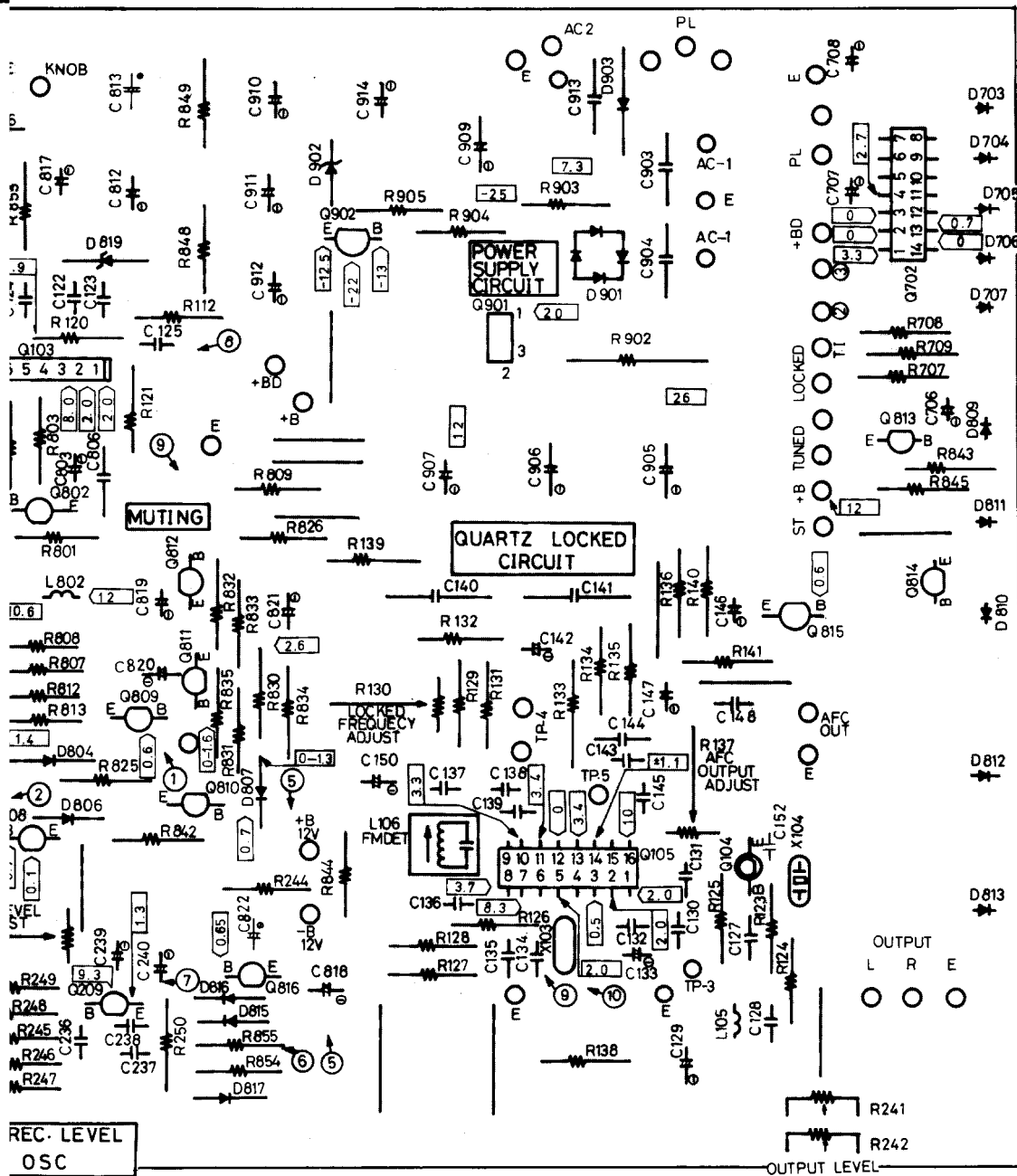




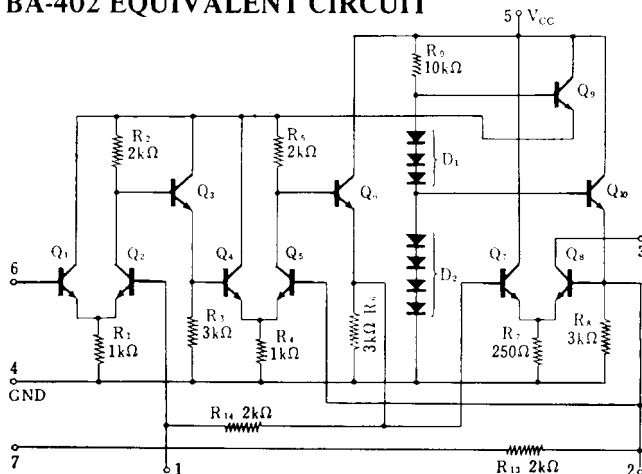


LB-1426 EQUIVALENT CIRCUIT

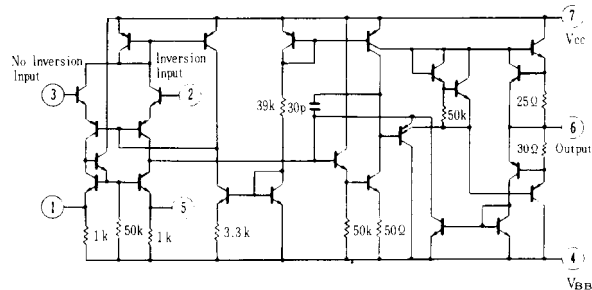




BA-402 EQUIVALENT CIRCUIT



TA-7302P EQUIVALENT CIRCUIT



PRINTED CIRCUIT BOARD – PARTS LIST (Universal model)

FM/AM TUNER PC BOARD (NARF-636a)
– PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION	CIRCUIT NO.	PARTS NO.	DESCRIPTION
ICs			C179	352741011	100 μ F, 16V, Elect.
Q101	222452	TA7302P	C182	352780101	1 μ F, 50V, Elect.
Q102	222540	HA11225	C183	352780331	3.3 μ F, 50V, Elect.
Q103	222468	BA402	C185	374124737	0.047 μ F \pm 20%, 50V, DE
Q105	222469	BA661	C187	352741001	10 μ F, 16V, Elect.
Q106	222418	HA1151	C201	352741001	10 μ F, 16V, Elect.
Q201	222419	HA1156W	C202	352740121	1,000 μ F, 16V, Elect.
Q801	222465	NJM-4558D	C203	374124735	0.047 μ F \pm 20%, 50V, DE
Q901	222542	FS-7812M	C204, C205	392884797	0.47 μ F, 50V, LL
Transistors			C206	392880107	1 μ F, 50V, LL
Q104	2211823	2SC380TM(0)	C207	372325114	510pF \pm 5%, 50V, ST
Q107, Q202	2210746 or	2SC945A(P) or	C209	352742211	220 μ F, 16V, Elect.
	2211255	2SC1815(GR)	C211, C212	352780221	2.2 μ F, 50V, Elect.
Q203, Q204	2210746	2SC945A(P)	C219, C220	352780101	1 μ F, 50V, Elect.
Q205-Q208	2211733	2SC1845(E)	C223, C224	392880107	1 μ F, 50V, LL
Q209	2210746	2SC945A(P)	C226	352743311	330 μ F, 16V, Elect.
Q701	2210823	2SC1657(L-1)	C227, C228	352784791	0.47 μ F, 50V, Elect.
Q802-Q812	2210746	2SC945A(P)	C231, C232	352780101	1 μ F, 50V, Elect.
Q815	2210746	2SC945A(P)	C234	352743311	330 μ F, 16V, Elect.
Q816	2210746 or	2SC945A(P) or	C239	352784791	0.47 μ F, 50V, Elect.
	2211255	2SC1815(GR)	C240	352741001	10 μ F, 16V, Elect.
Q902	2211454	2SA1015(Y)	C705	352741001	10 μ F, 16V, Elect.
Diodes			C803	392883397	0.33 μ F, 50V, LL
D101-D102	223105	1S1555	C805	352780221	2.2 μ F, 50V, Elect.
D103	4000022	VD1212	C807	352780101	1 μ F, 50V, Elect.
D104, D106	223105	1S1555	C808	352721011	100 μ F, 6.3V, Elect.
D201, D202	223105	1S1555	C811	352780101	1 μ F, 50V, Elect.
D701, D702	223103	1N60	C812, C813	352743311	330 μ F, 16V, Elect.
D801, D802	223103	1N60	C815	352742201	22 μ F, 16V, Elect.
D803-D807	223105	1S1555	C816	352784791	0.47 μ F, 50V, Elect.
D814-D816	223105	1S1555	C817	352741001	10 μ F, 16V, Elect.
D817, D818	223103	1N60	C818	352722211	220 μ F, 6.3V, Elect.
D819	223943 or	RD4.7EB or	C819, C820	392880227	2.2 μ F, 50V, LL
	224011	YZ-047	C821	352721011	100 μ F, 6.3V, Elect.
D901	223862	WL01	C822	352742211	220 μ F, 16V, Elect.
D902	223924	WZ-130	C823	352741001	10 μ F, 16V, Elect.
D903	223858 or	GP08D or	C905	352764711	470 μ F, 35V, Elect.
	223802	1S1885	C906	352754711	470 μ F, 25V, Elect.
Coils			C907	352742211	220 μ F, 16V, Elect.
L101	233144	NCH-1020, 22 μ H	C909	352764711	470 μ F, 35V, Elect.
L103	233105 or	NCH-1005 or	C910	352762211	220 μ F, 35V, Elect.
	233024	NCCH-1501	C911, C912	352742211	220 μ F, 16V, Elect.
L104	233121	NCH-3012	C914	352734711	470 μ F, 10V, Elect.
L105	233105 or	NCH-1005 or	Resistors		
	233024	NCCH-1501	R130	5225089	N10HR30KBC, Quartz lock circuit
L107	232065	NMO-2002	R137	5225056	adjust, variable
L201	233032A	NMC-8-7	R208	5225019	N10HR5KBC, Quartz lock circuit
L801	233122	NCH-3013			N10HR4.7KBD, V.C.O. adjust,
L802	233031	NMC-9-1	R224	5225018	variable
Transformers					N10HR2KBC, Separation adjust,
L102	233143	NFIF-6008	R241, R242	5148012	variable
L106	233120	NFIF-6006			N16RG10KB35, Output level
L108	232041	NIT-0509	R251	5225017	adjust, variable
Ceramic filters			R705	5225034	N10HR10KBC, Rec. check level
X101, X102	3010028	CFM107K14			adjust, variable
X103	3010006	SFE10.7MA(RED)	R804	5225058	N10HR47KBD, Strength meter
X105	3010012	CFT-455B			adjust, variable
X'tal			R902	441724304	N10HR50KBC, Muting level adjust,
X104	3010015	XTL-10.7M			variable
Capacitors					43 Ω , 2W, Metal oxide film
C107	352750571	4.7 μ F, 25V, Elect.	Switches		
C108	352784791	0.47 μ F, 50V, Elect.	S201-S205	25035112	NP-322-242-L77, Selector/Muting/
C110	352721011	100 μ F, 6.3, Elect.			Stereo noise filter/De-emphasis/
C114	352780101	1 μ F, 50V, Elect.	S206	250142	Rec. check/
C116	352741001	10 μ F, 16V, Elect.			NSS-2225, De-emphasis
C119	352741001	10 μ F, 16V, Elect.	Shielded case		
C129	352744701	47 μ F, 16V, Elect.	27150103		X'tal oscillator
C133	352741001	10 μ F, 16V, Elect.	Radiator		
C142	352742201	22 μ F, 16V, Elect.	27160029		RAD-07
C146	352741001	10 μ F, 16V, Elect.	LAMP PC BOARD (NAPL-639) – PARTS LIST		
C147	352780101	1 μ F, 50V, Elect.	CIRCUIT NO.	PARTS NO.	DESCRIPTION
C150	352741011	100 μ F, 16V, Elect.	PL801	210064	250mA, 6.3V, Pilot lamp
C151	352741021	1,000 μ F, 16V, Elect.			
C173	372323614	360pF \pm 5%, 50V, ST			
C178	352741001	10 μ F, 16V, Elect.			

INDICATOR PC BOARD (NADIS-637) **— PARTS LIST**

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	IC	
Q702	222541	LB-1426
	Transistors	
Q813	2210746	2SC945A(P)
Q814	2210803	2SA733(P)
	L.E.Ds	
D703-D707	225028	GL-9PG59, Green
D812		
D809, D810	225031	GL-9PG6, Triangle

CIRCUIT NO.	PARTS NO.	DESCRIPTION
D811	225018	GL-2PR1, Red
D813	225029	GL-9PR9, Red
	Capacitors	
C706	352750471	4.7 μ F, 25V, Elect.
C707, C708	352741001	10 μ F, 16V, Elect.

NOTE: Capacitor: ST: Polystren film capacitor
 DE: Non-inductive polyester film capacitor
 LL: Low leakage current type electrolytic capacitor

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